

C L A I M S

1. An artificial turf filament, wherein the filament (20; 30; 40; 45) has in cross-section:

- a central area (11; 46) and
- two wing areas (12, 13; 47, 48) on opposite sides of said central area and integral with said central area, said wing areas (12, 13; 47, 48) being arranged in a diverging orientation, wherein each wing area is defined by opposed faces (12a, 12b, 13a, 13b; 47a, 47b, 48a, 48b),

characterized in that

- at the side of the diverging wing areas the central area (11; 46) forms an outwardly protruding bulb, preferably having a face (11b; 46b) of a curved convex shape, so that said central area (11;46) forms a protrusion with respect to the adjacent faces (12b, 13b; 47c, 48c) of the wing areas (12, 13; 47, 48), and
- at the side remote from the diverging wing areas (12, 13; 47, 48) the central area (11; 46) has a face (11a; 46a) which is essentially flush at the location of said central area (11; 46) and merges into the adjacent faces (12a, 13a; 47b, 48b) of each wing area (12, 13; 47, 48).

2. An artificial turf filament according to claim 1, wherein the filament, preferably the central area, is fortified by one or more reinforcement fibres (74).

3. An artificial turf filament according to claim 1, wherein the central area (11; 46) of the filament has a thickness at least 50%, preferably at least 100%, greater than the thickness of the wing areas (12, 13; 47, 48), at least of a part of each wing area adjoining said central area.

4. An artificial turf filament according to one or more of the preceding claims, wherein the wing areas have a cross-section differing from one another.

5. An artificial turf filament according to one or more of the preceding claims, wherein the wings areas (12, 13) each have an essentially straight centre line (14, 15).

5 6. An artificial turf filament (45) according to one or more of the claims 1- 4, wherein the wing areas (46, 47) each have a curved centre line.

10 7. An artificial turf filament according to one or more of the preceding claims, wherein the distance between the centre lines of the wing areas (12, 13; 47, 48) is the greatest at the free ends of the wing areas.

15 8. An artificial turf filament according to one or more of the preceding claims, wherein the centre lines (14, 15) of the wing areas - if said centre lines are essentially straight - or imaginary lines interconnecting a centre point of said central area (46) with a point where each of the centre lines intersects the free end of the wing area (47, 48) - if said centre lines are essentially curved
20 - include an angle of less than 170 degrees.

9. An artificial turf filament according to claim 8, wherein said angle is between 90 and 170 degrees, preferably between 100 and 150 degrees, most preferably between 100 and 135 degrees.

25 10. An artificial turf filament according to one or more of the preceding claims, wherein the wing areas (12, 13) have a thickness measured at right angles to the associated centre line (14, 15), and wherein the wing areas each have a thickness which tapers towards
30 the free end of the wing.

11. An artificial turf filament according to one or more of the preceding claims, wherein the free end of each wing area (12, 13; 47, 48) has a rounded tip (12c, 13c; 47d, 48d).

35 12. An artificial turf filament according to claim 11, wherein the rounded tip (12c, 13c; 47d, 48d) has a radius greater than a part of

the wing area (12, 13; 47, 48) adjoining said rounded tip (12c, 13c; 47d, 48d).

13. An artificial turf filament according to one or more of the
5 preceding claims, wherein the filament (10, 20, 30, 40; 45, 70)
contains at least one synthetic polymer.

14. An artificial turf filament according to claim 13, wherein the
10 filament (10, 20, 30, 40; 45, 70) contains polyethylene.

15. An artificial turf filament according to claims 2 and 16,
wherein the one or more reinforcement fibres are polyamide or PBT
(polybuthylene therephtalate) fibres embedded in polyethylene or
another polymer.

16. An artificial turf filament according to one or more of the
15 preceding claims, wherein the filament contains an organic material.

17. An artificial turf including a plurality of artificial turf
20 filaments according to one or more of the preceding claims.

18. An artificial turf (1) having a substrate and a plurality of
artificial turf filaments according to one or more of the preceding
claims anchored in the substrate and extending there from.

25 19. An artificial turf according to claim 18, wherein said
filaments are injected into the substrate, and wherein the substrate
is preferably soil.

30 20. An artificial turf according to claim 18, wherein said
substrate (4) is a carpet and said filaments are anchored to said
carpet.

21. An artificial turf according to claim 18, wherein said
35 artificial further includes a backing (3) for said substrate (4),
said filaments being anchored to said substrate.

22. An artificial turf filament, characterized in that the cross-section of the filament (20; 30; 40; 45) has a central area (11; 46) and two wing areas (12, 13; 47, 48) on opposite sides of said central area and integral with said central area, said wing areas (12, 13; 47, 48) being arranged in a diverging orientation.

23. An artificial turf filament according to claim 22, wherein the filament is fortified by:

- the central area (11; 46) of the filament having a thickness greater than the thickness of the wing areas (12, 13; 47, 48), and/or
- the filament, preferably the central area, containing one or more reinforcement fibres (74).

24. An artificial turf filament according to claim 23, wherein the central area (11; 46) of the filament has a thickness at least 50%, preferably at least 100%, greater than the thickness of the wing areas (12, 13; 47, 48), at least of a part of each wing area adjoining said central area.

25. An artificial turf filament according to one or more of the preceding claims 22-24, wherein the wing areas have a cross-section differing from one another.

26. An artificial turf filament according to one or more of the preceding claims 22-25, wherein the wings areas (12, 13) each have an essentially straight centre line (14, 15).

27. An artificial turf filament (45) according to one or more of the claims 22-25, wherein the wing areas (46, 47) each have a curved centre line.

28. An artificial turf filament according to one or more of the preceding claims 22-27, wherein said filament (45) has opposed faces, said central area (46) forming a protrusion in one of said faces with respect to the adjoining parts of said face defining the

wing areas, the other face being essentially flush at the location of said central area (46).

29. An artificial turf filament according to one or more of the preceding claims 22-28, wherein the distance between the centre lines of the wing areas (12, 13; 47, 48) is the greatest at the free ends of the wing areas.

30. An artificial turf filament according to one or more of the preceding claims 22-29, wherein the centre lines (14, 15) of the wing areas - if said centre lines are essentially straight - or imaginary lines interconnecting a centre point of said central area (46) with a point where each of the centre lines intersects the free end of the wing area (47, 48) - if said centre lines are essentially curved - include an angle of less than 170 degrees.

31. An artificial turf filament according to claim 30, wherein said angle is between 90 and 170 degrees, preferably between 100 and 150 degrees, most preferably between 100 and 135 degrees.

32. An artificial turf filament according to one or more of the preceding claims 22-31, wherein the wing areas (12, 13) have a thickness measured at right angles to the associated centre line (14, 15), and wherein the wing areas each have a thickness which tapers towards the free end of the wing.

33. An artificial turf filament according to one or more of the preceding claims 22-32, wherein the free end of each wing area (12, 13; 47, 48) has a rounded tip (12c, 13c; 47d, 48d).

34. An artificial turf filament according to claim 33, wherein the rounded tip (12c, 13c; 47d, 48d) has a radius greater than a part of the wing area (12, 13; 47, 48) adjoining said rounded tip (12c, 13c; 47d, 48d).

35. An artificial turf filament according to one or more of the preceding claims 22-34, wherein each wing area (12, 13) has opposed

aces (12a, 12b, 13a, 13b) tapering towards the free end of the wing area.

36. An artificial turf filament according to one or more of the
5 preceding claims 22-35, wherein the central area (11) has - in the direction of a bisector of both centre lines of the wings - a dimension (T) greater than the thickness of the wing areas.

37. An artificial turf filament according to one or more of the
10 preceding claims 22-36, wherein the filament (10, 20, 30, 40; 45, 70) contains at least one synthetic polymer.

38. An artificial turf filament according to claim 37, wherein the
15 one or more polymers are selected from the group consisting of polyamides, polyesters, polyethylene, polypropylene, nylon.

39. An artificial turf filament according to claims 23 and 37,
wherein the one or more reinforcement fibres are polyamide or PBT
(polybutylene terephthalate) fibres embedded in polyethylene or
20 another polymer.

40. An artificial turf filament according to one or more of the
preceding claims 22-39, wherein the filament contains an organic
material.

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41. An artificial turf filament according to the drawing.

42. An artificial turf including a plurality of artificial turf
filaments according to one or more of the preceding claims 22-41.

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43. An artificial turf (1) having a substrate and a plurality of
artificial turf filaments according to any of the preceding claims
22-42 anchored in the substrate and extending there from.

35 44. An artificial turf according to claim 43, wherein said filaments are injected into the substrate, and wherein the substrate is preferably soil.

45. An artificial turf according to claim 43, wherein said substrate (4) is a carpet and said filaments are anchored to said carpet.

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46. An artificial turf according to claim 43, wherein said artificial further includes a backing (3) for said substrate (4), said filaments being anchored to said substrate.

10 47. Bundle of a plurality of artificial turf filaments, characterized in that the artificial turf filaments (50) are held together by one or more wrapping filaments (60a, 60b) wrapped around said artificial turf filaments (50).

15 48. Bundle according to claim 47, wherein multiple wrapping filaments (60a, 60b) are wrapped around said artificial turf filaments.

20 49. Bundle according to claim 47 or 48, wherein said one or more wrapping filaments are wrapped around said bundle in a helical path, preferably - if multiple wrapping filaments are present - in opposite directions.

25 50. Bundle according to claim 48 or 49, wherein the wrapping filaments (60a, 60b) cross each other at cross points (61), and are bonded, preferably releasable bonded, to one another at said cross points.

30 51. Bundle according to any of claims 47-50, wherein said one or more wrapping filaments (60a, 60b) are bonded, preferably releasable bonded, to said artificial turf filaments (50).

35 52. Bundle according to claim 51, wherein said one or more wrapping filaments (60a, 60b) are synthetic polymer filaments and are bonded to each other and/or to the artificial turf filaments (50) by a thermal bonding process.

53. Bundle according to any of claims 47-52, wherein said one or more wrapping filaments (60a, 60b) are releasable bonded so that upon mechanical action, by normal use of a artificial turf containing said bundles and/or by a brushing process applied to said turf, the bonds are released.

54. Bundle according to any of claims 47-53, wherein said one or more wrapping filaments (60a, 60b) have a thickness which is less than the thickness of the artificial turf filaments (50).

55. Method of manufacturing a bundle of a plurality of artificial turf filaments, **characterized in that** said multiple artificial turf filaments (50) are held next to one another while one or more wrapping filaments (60a, 60b) are wrapped around said artificial turf filaments.

56. Method according to claim 55, wherein multiple wrapping filaments (60a, 60b) are wrapped around the artificial turf filaments (50), preferably in opposite helical paths such that said wrapping filaments cross each other at cross points (61).

57. Method according to claim 55 or 56, wherein the one or more wrapping filaments (60a, 60b) are bonded, preferably releasable bonded, to said artificial turf filaments (50).

58. Method according to claim 57, wherein said one or more wrapping filaments (60a, 60b) are synthetic polymer filaments and are bonded to each other and/or to the artificial turf filaments (50) by a thermal bonding process.

59. Method according to claim 58, wherein said one or more wrapping filaments (60a, 60b) are heat treated before wrapping around said artificial turf filaments (50), so that the surface of the wrapping filament melts and the melted surface is brought against the artificial turf filaments as the one or more wrapping filaments are wrapped around said artificial turf filaments.

60. Method according to claim 59, wherein the artificial turf filaments (50) and the one or more wrapping filaments (60a, 60b) are subjected to a common heat treatment, the one or more wrapping filaments having a smaller thickness and thus being heated to a higher temperature, so that the surface of the one or more wrapping filaments melts.

61. Artificial turf comprising a substrate (4) and a plurality of bundled artificial turf filaments (50, 60a, 60b) according to one or more of the preceding claims 47-54 extending from said substrate.

62. Artificial turf comprising a substrate (4) and a plurality of bundled artificial turf filaments (50, 60a, 60b) according to one or more of the preceding claims 47-54 extending from said substrate, wherein said wrapping filaments release from said bundles as a result of normal use of said turf, e.g. by playing soccer, and/or as a result a wrapping filament release treatment applied to said turf after installation of said turf.

63. Method of preparation of an artificial turf according to any of the claims 61 or 62, wherein said turf (1) is subjected to a wrapping filaments release treatment effecting the release of the wrapping filaments from the artificial turf filaments.

64. Method of preparation of an artificial turf according to any of the claims 61-63, wherein - prior to effecting the release of the wrapping filaments - a filling material is deposited between the bundles of artificial turf filaments.

65. Method according to claim 65, wherein said filling material includes rubber particles.

66. Method of production of an artificial turf wherein a plurality of artificial turf filaments (50, 60a, 60b) are produced and subsequently bundled by one or more wrapping filaments according to one or more of the preceding claims 47-54, and wherein the wrapped

bundle of filaments is subsequently supplied to a tufting machine which produces the artificial turf containing the filaments.